



INL collects, analyzes and disseminates data on vehicle performance, how drivers use and charge the machines, and the impact to local and regional electric utilities.

INL research team hits 100 million-mile mark

By Kortny Rolston-Duce, *INL Communications & Governmental Affairs*

Few people can claim to have logged 100 million vehicle road miles. But as of May, Idaho National Laboratory's Advanced Vehicle Testing Activity team can.

The research team hit the mark after 19 years of collecting and analyzing road data from 11,500 battery electric, plug-in hybrid, hybrid electric and other advanced electric drive vehicles.

"It was a major milestone for us," said Jim Francfort, lead scientist for the AVTA. "We believe we have the most extensive collection of field-based advanced electric drive vehicle and charging data in the country."

INL began supporting the U.S. Department of Energy's Vehicle Technologies Office in the 1990s.

The INL team collects, analyzes and disseminates data on vehicle performance, how drivers use and charge the machines, and the impact to local and regional electric utilities.

INL supplies the information to DOE, automobile and charger manufacturers, potential buyers, regulators, and other stakeholders who use it to decide where to install charging infrastructure, enact new standards or choose which vehicle technology best suits their needs.

With electric vehicles, evaluating driver behavior is as important as testing performance, Francfort said.

"We need to understand if and how drivers adapt the different electric drive technologies and where to place charging infrastructure," he said. "That is, do drivers prefer to recharge their vehicles at home, at work, during long trips or while shopping and running errands?"



INL supplies information that helps stakeholders decide where to install charging infrastructure, enact new standards or choose which vehicle technology best suits their needs.

INL partners with private companies, individual vehicle owners and government agencies — particularly those that operate fleets — on all of its AVTA projects.

The team currently is gathering most of its data via ECOTality, which is operating the EV Project. The San Francisco-based company has one of the largest single-electric drive vehicle and charging demonstrations in the world. Other charging providers, such as ChargePoint and vehicle manufacturers OnStar/General Motors and Nissan, also are supplying data to INL.

But INL also collects information through smaller partnerships such as one it forged with New York City's Taxi and Limousine Commission. Idaho researchers are collecting and analyzing data from six Nissan Leafs the agency recently introduced into New York City's fleet of 40,000 taxis.

The goal is not just to evaluate how the vehicles perform in the city's climate and traffic, but also to identify potential sites for charging stations and decide whether it's feasible to convert one-third or more of New York's taxi fleet to electric models.

For Francfort, who has led INL's Advanced Vehicle Testing Activity since 1994, the biggest change is technology.

Early on, INL tested primarily light trucks and vans because the batteries took up so much space. (Researchers also evaluated small sedans but the passenger seats were often removed or blocked for safety reasons because the lead-acid batteries weighed so much.)

By the Numbers

100 million: Miles of advanced vehicle data INL researchers have collected and analyzed since 1994.

11,500: Number of electric-drive vehicles from which that data was gathered.

120: Number of vehicle models that produced the 100 million miles of test data.

6: Average number of days it now takes the team to gather 1 million test miles.

Did you know?

INL currently receives data (collected wirelessly) from more than 19,000 vehicles and chargers through various U.S. Department of Energy co-funded projects.

The INL team also amassed data on 386 then state-of-the-art personal computers that sat inside a vehicle cabin. Researchers downloaded data onto floppy disks, which were then mailed.

Today, the Nissan Leafs, Chevrolet Volts and other advanced light-duty vehicles INL scientists analyze are equipped with sensors that gather a variety of data and send it via a wireless signal in almost real-time.

The INL team is now collecting 1 million miles of test data every six days.

"We accumulate and disseminate data so much faster," Francfort said. "You couldn't do that mailing a floppy disk back and forth."

Know your electric vehicle lingo

Not all hybrid or electric vehicles are the same. INL's Advanced Vehicle Testing Activity has tested a variety of electric vehicle models and technologies, including:

Hybrid Electric Vehicles (HEV) Think of the Toyota Prius. Vehicles are equipped with batteries and combustion engines which work together to propel the vehicle as efficiently as possible. When the battery runs low, the combustion engine kicks in and charges the battery, or it is charged by regenerative braking.

Plug-In Hybrid Electric Vehicles (PHEV) Think of the Toyota Prius Plug-In. These vehicles include both battery and combustion engines but they must be connected to the electric grid to fully charge. When fully charged, they can run as an electric vehicle with limited power, but the combustion engine must run for full performance. When the batteries are discharged, the vehicle operates like a hybrid electric vehicle.

Battery Electric Vehicles (BEV) Think of the Nissan Leaf. These vehicles are powered only by a battery supplying an electric motor. Once the battery runs low, they are recharged by plugging into the grid.

Neighborhood Electric Vehicles (NEV) A neighborhood electric vehicle is a 4-wheeled vehicle, larger than a golf cart but smaller than most light-duty passenger automobiles. These small battery electric vehicles were initially used in gated communities and have a top speed normally limited to 25 mph.

Urban Electric Vehicles (UEV) Urban electric vehicles (UEVs) are regular passenger vehicles with top speeds of about 60 mph and a per-charge range of about 50 miles. UEVs usually have two doors and a hatchback, and are designed to carry two or four passengers.

Extended Range Electric Vehicles (EREV) Think of the Chevrolet Volt. When the batteries are charged, they function as a full-performance electric vehicle. Once the battery runs low, the vehicle operates like a hybrid electric vehicle, powered by a combination of a combustion engine and electric motor.

Start/Stop Hybrid Vehicles The vehicle's internal combustion engine shuts down when the vehicle stops in traffic, and re-starts quickly when the driver lets off the brake pedal or pushes in the clutch. Fuel is conserved by reducing the time spent idling. They do not use electrical energy for propulsion, so they are not considered electric vehicles. Popular in Europe for several years, Ford, Volkswagen, BMW and other carmakers now offer these systems on their U.S. vehicles.

(Posted July 3, 2013)

[Feature Archive](#)